

*Amended by
Office 3/4***Claims**

Sub C1
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1. Process for qualitative and/or quantitative detection of analytes in liquid and/or solid phases, characterized in that stable or quasi-stable ferromagnetic or ferrimagnetic substances are used as magnetic labeling that is to be identified in immunoassays or other binding assays and the remanent magnetization of the sample is determined as a measurement variable.

Sub C2
E2

2. Process for qualitative and/or quantitative detection of analytes in immunoassays or other binding assays, wherein, at the time of measurement, bound magnetic markers in their totality produce a remanent magnetization of the sample, while at the time of measurement the magnetization of unbound magnetic markers that are present in the sample in their totality fades owing to extrinsic superparamagnetism.

Sub C3
D3
E3

3. Process for qualitative and/or quantitative detection of analytes in liquid and solid phases, wherein

- (i) first structure-specific substances are labeled with ferrimagnetic or ferromagnetic substances, and then
- (ii) these magnetic labeled structure-specific substances are used in a sample that is to be measured,
- (iii) the sample to be measured is magnetized with the aid of a magnetic field of suitable intensity that is applied from the outside and,
- (iv) after the external field is shut off, the remanence of the magnetization of the colloidal particles is measured with the aid of magnetic field sensors,

whereby the remanence that occurs due to specific binding and its extent are used for analysis.

- Sub C*
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- A process* *claim 2*
4. ~~Process~~ according to ~~claims 2 and 3~~, wherein ~~instead of~~

the ~~structure-specific substances~~, analytes that are to be identified are labeled with ferrimagnetic or ferromagnetic substances and the structure-specific substances are added to the samples that are to be measured.

- Sub C3*
- A process* *claim 1*
5. Process according to ~~claims 1 to 4~~, wherein the structure-specific substances are antibodies, antibody fragments, biotin, or substances that bind specifically to biotin such as avidin or streptavidin, agonists that bind specifically to receptors or their antagonists, specific peptides and proteins, receptors, enzymes, enzyme substrates, nucleotides, ribonucleic acids, deoxyribonucleic acids, carbohydrates, or lipoproteins.

- A process* *claim 3*
6. ~~Process~~ according to ~~claims 4 and 5~~, wherein the structure-specific substances have a binding constant in the range of 10^5 - 10^{15} (mol/l)⁻¹.

- A process* *claim 3*
7. ~~Process~~ according to ~~claims 3 and 4~~, wherein the structure-specific substances have a binding constant in the range of 10^7 - 10^{15} (mol/l)⁻¹.

- A process* *claim 1*
8. ~~Process~~ according to ~~claims 1 to 7~~, wherein the sample is moved during the measurement and ~~thus the~~ sample signal is modulated.

- Sub C4*
- claim 1*
9. Process according to ~~claims 1 to 8~~, wherein induction coils that are hooked up as gradiometers, fluxgate-magnetometers, giant magnetoresistance sensors, or magnetoresistive converters are used as magnetic field sensors.

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10. Process according to ~~claims 1 to 8~~^{claim 1}, wherein SQUIDS are used as magnetic field sensors.

11. ~~Process~~^{A process} according to ~~claims 1 to 10~~^{claim 1}, wherein simultaneous determination of several different analytes in liquids or solid substances is carried out by ~~step-by-step~~^{sequential} magnetization of ~~the~~^a sample to be measured.

12. ~~Process~~^{A process} according to claim ~~11~~⁵, wherein for simultaneous quantitative determination of analytes, different ferromagnetic or ferrimagnetic substances with discrete coercive field intensities are used.

13. Process according to ~~claims 1 to 12~~^{claim 1}, wherein the intrinsic Neelian relaxation times of the ferromagnetic and ferrimagnetic substances that are used are greater than the measuring time.

14. Process according to claim 13, wherein the Neelian relaxation times of the ferromagnetic and ferrimagnetic substances that are used are longer than 10^{-4} seconds at 20°C.

15. Process according to claim 13, wherein the Neelian relaxation times of the ferromagnetic and ferrimagnetic substances that are used are longer than 1 second at 20°C.

16. ~~Process~~^{A process} according to ~~claims 1 to 15~~^{claim 1}, wherein the ferromagnetic and ferrimagnetic substances have a particle size ~~in the range of 1 to 1000 nm.~~

17. ~~Process~~^{A process} according to ~~claims 1 to 16~~^{claim 1}, wherein the ferromagnetic and ferrimagnetic substances have a particle size ~~in the range of 2 to 500 nm.~~

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18. ^{A process} ~~Process~~ according to ^{claim 1} ~~claims 1 to 17~~, wherein the ferromagnetic and ferrimagnetic substances are stabilized with a shell ~~that is made~~ of oligomeric or polymeric carbohydrates, proteins, peptides, nucleotides, surfactants, synthetic polymers, and/or lipids.

19. Compounds for use in processes according to ^{claim 1} ~~claims 1 to 18~~, wherein they consist of combinations of stable or quasi-stable ferrimagnetic or ferromagnetic substances with structure-specific substances.

20. Compounds for use in the process according to ^{claim 1} ~~claims 1 to 18~~, wherein the ferrimagnetic or ferromagnetic particles have a Neelian relaxation time that is longer than 10^{-4} second.

21. Compounds for use in the process according to ^{claim 1} ~~claims 1 to 18~~, wherein the ferrimagnetic and ferromagnetic particles have a Neelian relaxation time that is longer than 1 second.

22. Compound according to claim 19, wherein the structure-specific substances are antibodies, antibody fragments, agonists that bind specifically to receptors, cytokines, lymphokines, endothelins or their antagonists, other specific peptides and proteins, receptors, enzymes, enzyme substrates, nucleotides, ribonucleic acids, deoxyribonucleic acids, carbohydrates, or lipoproteins.

23. ^{The} ~~Compound~~ for use in the process according to ^{claim 1} ~~claims 1 to 18~~, wherein the ferromagnetic or ferrimagnetic substances are stable or quasi-stable colloidal particles that are made of iron oxides, barium ferrite, strontium ferrite, pure iron, chromium

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Sub C6

Sub C7

claim 11

claim 1.

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- (i) structure-specific substances are labeled with ferrimagnetic or ferromagnetic substances, and then
- (ii) these magnetic labeled structure-specific substances are introduced into the living organism or applied to the organism,
- (iii) an advantageous volume of the organism is magnetized with the aid of a magnetic field that is applied from the outside and,

(iv) after the external field is shut off, the remanence of the magnetization of the magnetic markers is measured with the aid of magnetic field sensors.

28. ^{A process}~~Process~~ according to claim 27, wherein antibodies, antibody fragments, agonists that bind specifically to receptors or their antagonists, ~~specific~~ peptides[^] and proteins, receptors, enzymes, enzyme substrates, nucleotides, ribonucleic acids, deoxyribonucleic acids, carbohydrates, or lipoproteins are used as structure-specific substances.

29. ^{The process}~~Process~~ according to claim 28, wherein the agonists or antagonists that bind specifically to receptors are cytokines, lymphokines, endothelins, or their antagonists.

30. ^{The process}³²~~Process~~ according to claim 28, wherein the structure-specific substances have a binding constant in the range of 10^5 - 10^{15} (mol/l)⁻¹.

31. ^{The process}³²~~Process~~ according to claim 28, wherein the structure-specific substances have a binding constant in the range of 10^7 - 10^{15} (mol/l)⁻¹.

32. ^{The process}¹⁶~~Process~~ according to ~~claims 26 to 31~~^{claim 26}, wherein Superconducting Quantum Interference Devices (SQUIDS), induction coils, fluxgate-magnetometers, giant magnetoresistance sensors, or magnetoresistive converters are used as magnetic field sensors.

33. Use of the compounds according to one of claims 19 to 23, in processes according to claims 27 to 32.

34. Use of ferrimagnetic or ferromagnetic substances in the process according to claim 26.

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Subcs> 35. Agents for use in processes according to ~~claims 27 to 32~~^{claim 27}, wherein they contain a mixture of different ferrimagnetic or ferromagnetic substances with structure-specific substances.

C 36. ~~The process~~^{The process} ~~Compounds for use in processes according to claims 26 to 32~~^{claim 26}, wherein the Neelian relaxation time of the ferromagnetic or ferrimagnetic substances is longer than 10^{-4} second at 37°C.

C 37. ~~The process~~^{The process} ~~Compounds for use in processes according to claims 26 to 32~~^{claim 26}, wherein the Neelian relaxation time of the ferromagnetic or ferrimagnetic substances is longer than 1 second at 37°C.

C 38. ~~The process~~^{The process} ~~Compounds according to claims 36 and 37~~^{claim 36}, wherein the ferrimagnetic or ferromagnetic substances are iron oxides or iron oxides with manganese, copper, nickel, or cobalt additives.

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